IN COMMEMORATION OF ALBERT SZENT-GYÖRGYI

IN MEMORIAM ALBERT SZENT-GYÖRGYI

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CONTENTS

1. Dr. János Szilárd Professor, Head of the Department of Neurology and Psychiatry, Rector of the Szeged University of Medical Sciences:
Remembering Albert Szent-Györgyi (Opening speech) 9
2. Gyula Papp Mayor of Szeged:
A citizen of Szeged had the honour of winning the Nobel Prize 14
3. Dr. Ferenc Guba Professor, Head of Department of Biochemistry of the Szeged University of Medical Sciences:
Albert Szent-Györgyi's contribution to a better understanding of the living state 19
4. Dr. Ede Kapuy Professor, Head of the Department of Theoretical Physics of the Attila József University:
Albert Szent-Györgyi and the electron theory of matter 24
5. Dr. Dániel Bagdy Professor, Institute for Drug Research:
Fellows' reminiscences 27
6. Dr. Béla Csákány Professor, Head of the Department of Algebra and Number Theory, Rector of the Attila József University:
The character of Albert Szent-Györgyi (Epilogue) 32
7. **Albert Szent-Györgyi in Szeged (Exhibition)**
Compiled by Dr. Tibor Szabó, research fellow and Dr. Andor Zallár, Head of the Central Library of the Szeged University of Medical Sciences:
Designed by János Sinkó Artist Lecturer at the Teachers' Training College 35

1.

JÁNOS SZILÁRD

Remembering Albert Szent-Györgyi

Honoured Guests!

The scientific world, our town and the universities of Szeged have suffered a sad loss. The Nobel Prize winner, Professor Albert Szent-Györgyi, honorary free citizen of Szeged, honorary doctor of our universities, who achieved worldwide fame for Hungarian science, died on October 22, at the age of 93. We have lost an extremely versatile man and an outstanding scientist who worked in Szeged for one and a half decades, a former lecturer, Dean and Rector of our universities, a friend of the young and a humanist peace fighter. He investigated the secrets of life, but was finally defeated physically by old age.

We pay respectful tribute to the man and scientist, his rich, creative life, and his humanity. I ask you to pay tribute to Professor Szent-Györgyi's memory by standing in silence for a minute.

Honoured Guests!

There has scarcely been a Hungarian scientist, about whom so much has been written and whose death was remembered on five continents, as Albert Szent-Györgyi. The volume of writings about him shows the many sides of his rich personality and give us insight into his thoughts about life, science and his humanistic principles. After his unexpected death, the writings about him suddenly multiplied. A summary of his work in Szeged is to be published soon.

Our commemoration today cannot be free of repetitions, but we wish to present the professor and scientist to our guests through the reminiscences of a former student and coworker, the chairman of the town council and the two universities. The name of Professor Szent-Györgyi has become inseparable from the town of Szeged and its universities. The most enlightened sons of Szeged battled for a century to establish a university and then to retain it. The exemplary willingness to make sacrifices and the pride of the town did not fail in achieving this goal: in less than two decades the university rid itself of its transplanted character and became an organic part of the life of Szeged. The sacrifices of the town for the university largely served the purposes of the medical faculty. The establishment of thes clinics as well as the research institutes in Dóm Square did not only mean modern development in the inner city, but also contributed greatly to the improvement of public health in Szeged. There was no institution in the town that directly or indirectly could have served the town to the same extent as the university. The collapse following the defeat of the Hungarian Soviet Republic and the Treaty of

Versailles turned Szeged into a frontier town setting back all the economic and cultural boom that had characterized preceding decades in the town. Thus the sacrifice made in the University's interests also made restore the former cultural role of the town and to re-establish it as the cultural center of the southern part of the country. Economic stagnation and unemployment, student poverty and a lack of teaching staff, antisemitic riots and the hatred of other nations, social inequality and rigid traditions awaited Professor Szent-Györgyi on his arrival in Szeged from England.

It was at the suggestion of Kunó Klebelsberg that the University Council invited the already internationally known young scientist who as a young man had studied everything that a biologist can study to raise the scientific reputation of the University and to fill the Chair of Medical Chemistry. Earlier he had studied and carried out research work in Pozsony, Bratislava, Prague, Berlin, Hamburg, Leiden, Groningen, Rochester and Cambridge. The fame of his research spread through international scientific circles. He was 33 when at the international congress in Stockholm his name was mentioned three times in the presidential opening speech, more frequently than anybody else's. At the age of 35, in 1928 in Cambridge, he discovered a substance, which later in Szeged turned out to be vitamin C; this discovery made him one of the best-known scientists in the world.

Professor Szent-Györgyi moved to Szeged in September 1930 and at the very first sight he contradicted all pre-conceived ideas of scientists. He was a cheerful athlete, full of energy and with a thirst for action. At the same time he was sensitive to the arts, especially music, an embodiment of the university of body and soul, an embodiment of kalokagathia. The bust of Szent-Györgyi by Gábor Vágó represents him in the style of the classical statues of athletes. In old photos we see a man deep in thought or relaxed in the arts. His modernity, his being different, surprised those around him. His sincerity and informality, irrespective of who he had dealings with, developed in the atmosphere of the bourgeois democracies, gained him friends and created critics. The group of his young coworkers became at once a large family and an enthusiastic team with a freedom of thought and errors, but working hard together as equals. His institute was a small island of democracy in the sea of semi-feudal Hungary drifting towards fascism.

Success followed success. In 1931 he discovered vitamin C. At this time he was already an internationally known scientist, he was receiving many invitations to lecture abroad, and was a member of many Hungarian and foreign scientific institutes and societies. The substantial support of the Rockefeller foundation was of great help to him in the difficult conditions in this country. In his first years in Szeged he devoted himself to research, but he played an important role also in ensuring the continued existence of the Medical Faculty in Szeged. During the term in office of Minister Bálint Hóman, Klebelsberg's principle of decentralization was replaced by uniform standardization of the cultural activities and increased control. Many departments first of all in the provincial universities fell victim to the new cultural policy and the economic restrictions. In the budget of 1932/33 the economic pressure envisaged a reduction of 70 departments and the closing of the University of Szeged, or at least the closing of the Medical Faculty in Szeged. The accusing and threatening declaration of Professor Szent-Györgyi played an important role along with the protest of the town of Szeged in thwarting Hóman's plan. Professor Szent-Györgyi threatened to leave the country if the faculty was closed.

Together with István Rusznyák and others he discovered vitamin P and used it in therapy, which earned him new domestic and foreign recognition and distinction.

Then on 28 October 1937 he won the still unique distinction in our country, the Nobel Prize. The first Nobel Prize in this country greatly increased the interest of foreign scientists in the scientific work going on at the University of Szeged and an increasing number of them visited the clinics and research institutes here. The name of the town and of its university became known throughout the scientific world, and this was all the more appreciated by the citizens of Szeged because it was connected with the typical product of the region, the paprika of Szeged. As Rector József Gelei said at an extraordinary session of the University Council, "...I regard the merits of Szent-Györgyi in many respects as merits of Szeged. His education broadened here partly through the help he gave to his students in research, partly through the paprika of Szeged, and I myself would like to stress that Szent-Györgyi's rising reputation is closely connected with the fact that he was invited by the University of Szeged, and that Szeged is a world-famous centre of paprika production. The honour that Szent-Györgyi has achieved in being awarded the Nobel Prize results also in glory to our University which sheds a favourable light on the scientific activity going on here."

At the council session of the Medical Faculty Szent-Györgyi refuted the glory with his usual modesty, saying that he was helped by two great forces. "One force is that which called our University into existence: it overwhelmed me with kindness and love and created favourable conditions for scientific work, true to the principle that a small nation has to maintain and defend itself with the weapons of culture. The other force is the friendly affection that has always surrounded me in the Faculty and which dispelled my worries and created a calm atmosphere for me. Therefore the recognition I have just received is due not to me in the first place, but to the University, which supported me, the circle of friends who made my work possible, the great ideal community, the aim of which is to get to know the unknown and to serve the country in a peaceful cultural struggle."

His gentle pacifism manifested itself first in his radio talk of 6 November 1937, which later developed into a fight against fascism and a bold peace struggle against the Vietnam war and atomic war when he was older.

"People of science", he said, "work first of all for peace. From their scientific discoveries they unfortunately forge most often the means of destruction, which then destroy the very results of science. I firmly believe that the principle of peace will sooner or later be victorious."

He went to receive his Nobel Prize as an honorary freeman of Szeged. Perhaps not a few people in the world learned from the press and the radio that there was a small town on the banks of the Tisza River whose young university had given a Nobel Prize winner to the world of science. The professor taught also at the Faculty of Mathematics and Natural Science. Thus it was that this Faculty conferred on him the degree of honorary doctor in 1938. In the spirit of enthusiasm following the high distinction decisions were made to eternalize the name of Szent-Györgyi and the memory of the Nobel Prize (naming a square after him, building the Szent-Györgyi villa, a statue, etc.), but besides the formalities of the honours conferred on him the people of Szeged kept the memory of the glorious day in their hearts. Inspite of allurements abroad and at home, Szent-Györgyi remained in Szeged; he wanted nothing but the love of his fellow-citizens.

He took up another branch of research. In the study of the oxigen uptake of muscle tissues he achieved such important experimental results that it was on their basis that Hans Krebs discovered one of the most important chemical transformation processes in the organism, the citrate cycle, which is rightly named

after Szent-Györgyi-Krebs cycle. It is superfluous to stress in Szeged that Szent-Györgyi's work still inspires hosts of researchers.

After the return of the University of Kolozsvár in 1940, he became the first Rector of the newly established University of Szeged. During his term of office he introduced several democratic reforms, fought against the drift toward fascism at the University, founded his democratic youth organization, created a club for the youth, and his students played Hamlet on the university stage. Szent-Györgyi broke down the barrier between teachers and students and set an example to the country for the development of a more democratic, more attractive student life. His reform proposals for the middle schools and universities were boldly progressive. On account of his progressive ideas he was attacked more and more sharply in parliament and in the right-wing press, which also affected his health. In 1942 he became leader of the resistance group named after him and in 1943 he conducted talks with the British in Istambul about Hungary changing sides. He was placed under police surveillance, persecuted by the Gestapo, and Hitler demanded his extradition. After the occupation of Hungary by the Germans he was obliged to go into hiding.

On January 10, 1945, Soviet soldiers brought him out of hiding and he and his wife became the guests of the Soviet high command. On February 9 he visited Szeged, but from April 27 he was already Head of the Institute of Medical Chemistry at the University of Budapest. Thus the direct contact between Professor Szent-Györgyi and the University of Szeged was broken for a long time. In the capital he carried on wide-ranging political and scientific political activities, then from 1947 he worked in the US as director of the Myological Research Institute of the Naval Laboratories at Woods Hole. His connections with Szeged were at this time limited to correspondence. From the sixties on, news of his scientific results and of his writings in the interests of strengthening peace arrived more and more often, and the Hungarian press, radio and television interviewed him more and more frequently. He came home in 1973 and on October 12 the degree of honorary doctor of Szeged University of Medical Sciences was conferred on him. Two moments of the touching event characterize the warmth of his perpetual connection with Szeged. In his speech he said: "...I am honorary doctor of several universities, but the present distinction, the present diploma, is doubly precious to me due to the fact that it is given to me by my own country, my own university. I still don't have a house on the Tisza riverside. My house stands beside another great water, I am now working in another country. My work belongs to the whole of mankind, but I seize this opportunity to declare that I am a Hungarian and I feel I belong to this country...". About the celebration he wrote in the guest book of our University: "What made this celebration particularly brilliant was not the pomp and circumstance, but the warm affection, which is the highest human value. This ceremony was one of the most outstanding events of my eventful life, for I have never met with so much affection, appreciation and warmth."

Ladies and Gentlemen!

It would be unworthy of the memory of Professor Szent-Györgyi to limit ourselves only to remembering. Our University has never forgotten its world famous scientist, and work has been going on for years to immortalize him in Szeged. At scientific conferences we have often dealt with is work. The last international congress associated with Szent-Györgyi's name was held only in August this year. In our teaching we have often remembered him and used his scientific results. Within the framework of the Festival Weeks in Szeged we mounted an exhibition in our central office building. A full account of his work in Szeged has been compiled and published in an abridged form, and the Szent-Györgyi monograph is to be published soon. The assignment of a place for the rich material of documents and objects of our Szent-Györgyi memorial museum and its standing exhibition is to take place in the near future. According to the plans of my predecessors, the late Rectors, and in agreement with the decision of the Rector's council I announce that we have asked that our University be allowed to bear the name of Professor Szent-Györgyi.

2.

GYULA PAPP

A citizen of Szeged had the honour of winning the Nobel Prize

Honoured Guests!

It is nearly six decades since Albert Szent-Györgyi became Professor and Head of the Institute of Medical Chemistry at the University of Szeged. He was a citizen of this town for fifteen years and after the Liberation in 1944 he was its guest, most recently and unfortunately for the last time in October 1973, when he came to the inauguration of the Biological Centre of the Hungarian Academy of Sciences and when at the same time the title of honorary doctor of his former university was conferred on him.

The people of Szeged received the elderly scientist with great respect, affection, and joy, — the man in whom they saw, not without justification, a son of our town, for Albert Szent-Györgyi had given many signs of his attachment to Szeged. At the degree ceremony he declared: "I was glad to come back to my home country to visit those places where I used to live and work, to meet those with whom I used to work, and to see what has become of my students. My coming had also another purpose: I wanted to recharge the batteries of my emotions. I wish to strengthen the ties that link me with Hungary and the University of Szeged." At his home in Woods Hole in 1981 he recalled the time he had spent here: "I went to Szeged to work there. The conditions were assured, with everything there together: the laboratory and the coworkers. Besides this quiet was needed, which I also found in that place. I always like to think back on the years I spent there." We were, of course, very glad to read these words of his.

In our country only Szeged has had the honour of having a Nobel Prize winner; an excellent scientist, who achieved a great deal of the results which this distinction recognized in the course of the scientific research work he carried out here, and who found the material of his sensational discovery in the typical product of this region, paprika. He himself said that his study of paprika was the key to his success.

It would of course be silly to think and boast that what the genius discovered here is thanks to the merit of Szeged. Yet it is surely permissible and understandable — although chance also had a hand in it — that Szeged should be proud of Albert Szent-Györgyi and that it should consider his work here as a scientist and university professor a fact, an event and a triumph in the cultural history of the town. It is clear that in this reciprocal relation between Szent-Györgyi and Szeged it is the town of Szeged that has more to be thankful for because it was through Albert Szent-Györgyi that the world learned of another aspect of Szeged, namely that important scientific work is going on here for the benefit of mankind, and it was through him that the fame of Szeged reached many places where until then the people had not

even heard of this town, and its fame grew where the people had not previously known in which corner of the world it was to be found.

Amid the enthusiastic celebration of the people of Szeged and the young people at its university, at the extraordinary general assembly of the city council the Nobel Prize winning scientist became the freeman of the city, the scientist who — as we can read in the minutes of the assembly — "earned fame for the town of Szeged" and carried on research "under difficult circumstances in a hostile, turbulent period, when misdirected science made life precarious". In his reply Szent-Györgyi said among other things: "It is gratifying that the people of Szeged have taken a liking to me; I have also taken a liking to the town, which has given a home to the University". Already in the statement he gave to the press his desire for peace is apparent, which he expressed so many times, in many places, and in many forms: "It is creative work and not destruction that leads to the prosperity of nations."

Ever since, the citizens of the town have been cherishing the memory of our popular scientist faithfully. This faithfulness to the memory of the professor of our University is well exemplified by the noble initiative that has developed under the auspices of the Szeged University of Medical Sciences and under our watchful eyes. Its aim is to collect any documents, objects, and intellectual material connected with Albert Szent-Györgyi, especially from the years of his stay in Szeged and his links with this town. Hundreds of gifts, of greater and lesser importance, yet certainly valuable data, carefully guarded or long mislaid treasures have come into the hands of our zealous caretakers (Tibor Szabó and Andor Zallár) and into the collection of the Szent-Györgyi Memorial Museum now in preparation. Many other signs also show how much sympathy accompanies this noble enterprise even on the part of those who themselves can contribute nothing more than their interest and attention.

The City Council of Szeged is preparing with carefully and responsibly its plans for how the city and its inhabitants should show their gratitude to their freeman, Albert Szent-Györgyi. We wish to make a lasting contribution to the memory of this great man.

The thought comes to us involuntarily: What is it that gives rise to such wide interest? It is certainly not only local patriotism or pride that this giant in the field of science history was connected with our town. I think there is much more behind it: the charm of an extremely colourful renaissance-type personality, a great thinker with a universal interest in the things and problems of the world, one who captivates the minds of millions with his clear truths by introducing them to the secrets and facts of the world, nature and society.

I think the secret of this extraordinary popularity, if it can be called a secret, is Albert Szent-Györgyi's behaviour as a human being, his modesty, purposefulness, his vitality even in old age, his persistence, or at least the purity of his mind, his solicitude for mankind, and his wise humanism. In his works he stress that science is for man and for humanity. We may say that he worked according to this principle throughout his long and successful career. We may call this view of life and science humanitarian, but also public and political. If we examine the content of his humanitarianism, it can best be linked to the humanism of the period of Enlightement in its progressivity and scientific basis. His philosophy agrees with Marxism in many ways, but in at least as many others it differs from it. What however cannot be de denied is his devotion to human progress, the cause of peace, and the need for peaceful coexistence of the nations.

On reading his writings, statements and speeches we can admire with what persistence the thought of the social responsibility of the scientist recurs in them

from his youth right up until the twilight of his life; the thought of how research or technical progress benefits man or turns against him. Time and time again this raises worries and doubts in him. "Man has only been able to free energies, but has not yet learned how to use them" he says in one of his writings. This recognition, his mind open to the world and to its horrors, led him to make repeated warnings of the dangers of nuclear weapons. This was what brought him into opposition with his extreme right-wing fellow scientist, Ede Teller, also of Hungarian origin and knows as father of hydrogen bomb. This was what led him to protest to Nixon in a sharply worded letter against the war in Vietnam and against other adventures as well as the craze of the arnaments drive. A thought occurs to him and he expresses it in words: "What is the good of research? Should science not be halted till mankind grows up, which is absolutely necessary to ensure that it can handle the power gained by science?" It is the optimistic, responsible scientist that speaks out in Szent-Györgyi when he rejects this alternative because he believes that the progress of science promises a way out of the problem. Other, earlier stages of Szent-Györgyi's career also give proof of his social and political devotion. With his unusual sensitivity he felt the approaching danger of fascism and war. His statement made to the newspaper Népszava when he was going to receive the Nobel Prize is proof of this. In November 1937 he said: "The man of science in the whole world today... is concerned with the question of peace. Our work, our endeavours are in vain if from our discoveries the means of destruction are forged and the fruit of our peaceful work is destroyed by a world conflagration. ... There is a frightening political tension today, although there could be enough room to live in and foot to eat for everybody. Only we ought to respect each other more and we ought to believe in the power of love and construction more than in the power of destruction."

He voiced a similar warning when the Nobel Prize was handed over to him and in his statement made on Stockholm radio. There can be no doubt that his words referred to the danger of Nazism when he said: "The causes of the present tensions and hatred are not in the human soul ... we ought to believe more in the power of love than in the power of violence. We ought to pay more attention to the slaughter of people even if it is called war." Then in conclusion he said: "Nations can stand not only one above the other, but also peacefully side by side." The humanitarian-thinking scientist proclaimed here the necessity of the power of love, but he could also hate, and the constraint of history, the threat of fascism prompted him to dangerous actions. His activity at the University of Szeged proves this, and his acceptance of this constraint took him out of the laboratory and the world of university education into the world of politics. His activity at the University of Szeged proves this, and his acceptance of this constraint took him out of the laboratory and the world of university education into the world of politics. His activity at the University of Szeged, his educational and youth political reform program, the creation of a united, progressive youth organization, were only the first stage in this development, because of which he was sharply attacked in parliamentary debates and in the press, although progressive press organs and such persons as Lajos Kassák and László Németh supported him.

From 1941 he took an active part in the bourgeois antiwar movement. He was an active member of the Szent-Györgyi Organization. It was on this basis that he went on his adventurous mission to Turkey with the aim of establishing connections with the Anglo-Saxon powers. It was thus that he came into contact with Prime Minister Miklós Kállay, with István Bethlen, who was a background influence in

Hungarian political life at the time, and he even came into contact with the Governor, Miklós Horthy.

Best known to the public in the resistance record of the professor is his mission to Turkey. Historical research has unveiled, though not fully, the role that he played in the movement led by Imre Alpári, former justice of Heves county, and István Fráter, councillor of the Ministry of the Interior, and in which Szent-Györgyi was considered for the post of Prime Minister during the political period after the planned landing of British and American forces in the Balkans. The public similarly knows little of the fact that on his return from Istambul and at the suggestion of the British Intelligence Service, it was on his initiative and with his active participation that the movement led by Alpári and his group began to form an armed wing, the organization of armed action groups, which came to a tragic end.

The scientist, who changed from research work to politics, was obliged to go underground after March 19, 1944, that is after the occupation of Hungary by the Germans. For a time the Swedish Embassy granted him asylum. Then, when the Gestapo discovered his hiding place, he went into hiding elsewhere and lived in difficult circumstances, in danger of his life, and was in the vicinity of Városliget when Liberation by the Red Army came in 1944.

After 1945 he took an extremely active part in the reviving Hungarian democratic public life. As he writes in his reminiscences, he was convinced that he had a mission: "I must help the crushed Hungarian culture." He did his share in the effort to reorganize the Hungarian Academy of Sciences and sharply criticized the learned society, which had earlier found its worthiest leader in Archduke Joseph, and declared that the organization was to a large degree responsible for the national catastrophy. He was of the opinion that the Academy in its composition, in its organization at that time, did not represent the founder Széchenyi's conception and that it could become the "citadel of independence and progress" only by reorganization.

Szent-Györgyi was also the founding president of the Hungarian-Soviet Cultural Society. At the invitation of Soviet scientists he visited Moscow (where he had already been in 1935) and, as we can read in the interview he gave to the newspaper Szabad Nép in August 1945, he returned from there with very favourable impressions.

Knowing his efforts for educational and pedagogical reforms, we cannot be surprised at the fact that he readily accepted a leading post in the National Council of Public Education. His proposals made for a democratic transformation of the school system are valid even now. He helped to develop the movement of people's colleges. He took part in, and spoke at, the third congress of the Hungarian Communist Party. The subject of his speech was of course science, support for research work, and the relationship between scholarly activity, democracy, and society.

He lived and worked in the liberated country for one and a half years, then in 1946, on a ski tour in Switzerland, he decided not to return home. Exploration of the causes is yet to be made. What we already know — he himself said so — is that one of his friends was arrested, but the political events of the coalition period, the trend of the political development also alarmed him.

He left Hungary and settled in America. His attitude towards his country changed with the passage of time. In the years of the cold war his position became even precarious. But the policy of his chosen home, the craze of the armaments drive, the murderous, destruction war in Vietnam with its cruelty, all these roused his conscience and directed his attention again to Hungary.

He never disowned his Hungarianness or Hungary, nor did his home country disown him. He was a Hungarian scientist and he professed to be one. "I am a Hungarian now as ever and my home country is Hungary" he said. He first came home in 1973. On this occasion he also came to Szeged, as I have have mentioned. Then in 1978 he was member of the delegation which brought the crown of Saint Stephen home from the United States.

Several of his works have been translated and published, his statements on radio and television were heard by millions, and his compatriots could become acquainted with his views, his work and recent research also through these channels.

In 1983 the Presidential Council awarded him the Banner Order decorated with rubies. Unfortunately this distinction could not be handed over to him in Hungary.

His death is a great loss to the whole of mankind. His departure is particularly sad for our small country, for this nation, on which the glory of his success shone for a long time. It is a great sorrow for us, people of Szeged, who have lost in him a great man who was intimately connected with us. His eventful and successful career, his love of life and humankind, his deep humanism must be an example to us who have a noble obligation: the preservation of the memory of this great man and the handing down of his memory to succeeding generations.

3.

FERENC GUBA

Albert Szent-Györgyi's contribution to a better understanding of the living state

Honoured Guests!

With regard to the immortality of great spirits Seneca writes the following: "Those who rise to the center of attention by pure chance, those who are but a tool and a part of others' power will only flourish and receive visitors in their homes as long as they stand high. The respect for great spirits, however, grows constantly and they are honoured not just for themselves but their fame underlies everything that pertains to their memory in one way or another".

Those dealing with the living organisms (and, for his greatness of soul, others, too) will remember Albert Szent-Györgyi in the centuries to come just as they will remember Darwin, Pasteur or Watson, one of the discoverers of the double helix: Szent-Györgyi has for ever inscribed his name in the history of the theory of the living state not only because he was awarded the Nobel Prize for his activity in 1937. Of the works for which the Novel Prize has been awarded a number have proved incorrect in the course of scientific development, and many of the seemingly outstanding results have been forgotten. Perhaps it was not the most significant scientific achievement in Szent-Györgyi's research activity that was awarded the highest scientific tribute of respect. Among other facts, his greatness is reflected in the quest by his creative spirit for opening ever newer paths towards a more thorough understanding of the material organization referred to as the living state.

His unforgettable memory is essentially based on this endeavour. When we think of Szent-Györgyi's life it is Madách's words that inevitably come to mind: "I said, man: struggle and hope trustfully". Szent-Györgyi lived a full life.

Although amongst the introductory lines to his curriculum vitae written at the editor's request for publication in the yearly issue on biochemistry we find the following: "I dedicate my life to science and my only real desire has been to promote science and to live a life according to its requirements", his scientific career cannot — perhaps due to this noble purpose and high moral motivation, and amidst the controversial developments of his era — be separated from his social activities, political declarations, from his attitude towards the arts, and, perhaps, even from his private life. Albert Szent-Györgyi was a humanist in the fullest sense of the word: he was a man full of emotions and evoking emotions who would, through failure, strive to find truth and consequently live according to this truth.

His scientific publications are amazingly colourful. The results he publishes are interspersed with a train of thoughts scintillating with wit. Seemingly remote experimental data or observations become in his explanation clear correlations, new interpretations of the facts observed or assessed.

Albert Szent-Györgyi's only scientific purpose was to understand and reveal the fundamental laws of matter as a living state. A classical formulation concerning life is what he wrote in "The science of Life" in the introduction to a volume on the frog and its heart published in 1943 under his editorship. The essence of this formulation is briefly as followes: in biology, 1 plus 1 does not equal 2, but is something else, something more, something new.

During his scientific career he was mainly concerned with the organization of matter into structures disposing signs of life and their functions. Striving for a better understanding of life he proceeded through stages of descriptive morphological, physiological and biochemical investigations towards the study of electron movement.

What he was actually working on, what structural layers, or what models he was dealing with, depended always on the stage of his mental development and experience, and, of course, on the actual problems to be solved through biochemistry, as well as on the appropriateness of the model used for answering the given question, and on the efficiency offered by the different methodological approaches. In this latter respect his intuitive way and ingenuity in finding simple solutions, sometimes confined to the mere use of test tubes, amazed both his colleagues and his scientific rivals. Mention should be made of the fact that, especially in the last few decades, many specialists doing excellent research in their own field and living with the magic of refined and mechanized devices have failed to understand the revelation of essential questions by Szent-Györgyi precisely because the methodological approach seemed to be oversimplified.

For the study of most biochemical and, in general, biological problems it is of utmost importance to select the suitable model, i.e. to decide what kind of living organism or what type of biochemical function or process should be chosen for answering the actual question. Szent-Györgyi was certainly aware of this. He was a master at finding and selecting the appropriate experimental model. This was the way he evaluated the functional importance of the morphological changes based on the molecular combination of proteins with respect to blood coagulation or to the muscle proteins named "actin" and "myosin". And this was the way he used the breast muscle of the pigeon for the study of the chemical energy production of the cells, of biological oxidation, etc. Working with these models in reassuringly suitable experimental conditions, he was able to obtain definite and commensurable answers to the questions "asked of nature". His profound knowledge of the field rested, in the first place, on his inclination towards experimentation. He came to know the living state through the touch of his fingers and the keen observation of his sharp eyes so that he spent most of his days in his laboratory even when he was already old.

The exploration of Szent-Györgyi's scientific activity, of its values and far-reaching effects, will take many years of work. The revelation of his heritage including his scientific results is one of our future obligations. It goes without saying that in this commemoration I can only refer to fragments, — sparks lighting torches in scientific life.

I will briefly throw some light on Szent-Györgyi's contribution to a better understanding of the living state by mentioning three seemingly unrelated topics of his scientific activity. They are as follows: biological oxidation, the physiology of the motion and the problem of cancer.

When Szent-Györgyi realized that one must go at least as far as the level of biochemical processes in order to reach a better understanding of the living state,

the burning question of modern biology at the time (in the 1920's) was the problem of chemical energy production obtained by biological combustion. (By the way, it seems that a final solution to this problem was reached only in the sixties, for which Mitchell, and of course, others in the meantime, were awarded the Nobel Prize.) At that time two research groups were taking an interest in the question and had rather unusual debates with each other: one of the groups (led by Wieland) considered the enzyme activation of nutriment hydrogen to be inseparable, whereas the other group (led by Warburg) claimed the enzyme activation of air oxygen to be inseparable, as evidenced by precise experiments. (As is well-known, although the combustion of nutriments is coupled with CO_2 expiration, the chemical energy relevant to the biological system is obtained from the union of hidrogen and oxygen, i.e. the formation of water.) Szent-Györgyi's ingenious experiments, the majority of which were carried out in collaboration with his colleagues in Szeged, produced evidence that both types of activation are necessary: the hydrogen of nutriments reaches air oxygen through different stages. The stages are represented by well-defined C_4 organic molecules oxaloacetic-, succinic-, fumaric-, and malic-acids. Through this observation (which meant, along with the discovery of vitamin C, the Nobel Prize for him), Szent-Györgyi put an end to a long-lasting debate and opened the way for a detailed description of energy production in the cells of most higher organisms. This fundamental observation by Szent-Györgyi and his colleagues led first to the exploration of the Tricarboxylic Acid Cycle (the Szent-Györgyi — Krebs cycle, as we Hungarians refer to it), and later to that of electron transportation.

It is worth noting that finding a relatively quick answer to the problem was due to the selection of the appropriate model. It was Szent-Györgyi who introduced sectioned breast muscle of the pigeon in analyzing cellular respiration. Now we know that this muscle can do its job (i.e. provides for the long-time flight of the pigeon) because it is rich in mitochondria, which are the organelles of cellular respiration.

And now I shall turn to the second topic. In Szeged, the investigations with muscles began with the application of pigeon breast muscle. But Szent-Györgyi was not interested in muscle tissue either in this study of the muscle with a view to motion and its related phenomena in all living beings, or in other studies to be mentioned later on. In this case, too, he made use of the muscle to answer one fundamental question in biology. Muscle, again, was used as a model due to its specification as an organ of motion. (It should be added that Szent-Györgyi had brought over a specialist in muscle physiology, Jenő Ernst — lest some trivial set-back should occur — who kept on working in the laboratory in Szeged in his own field.) The study of muscle motility (muscle contraction and relaxation, mechanical work done by muscle) began in Szeged in 1940 and was continued in Budapest under his guidance till 1947, when Szent-Györgyi left the country. This work involved almost all his colleagues in Szeged and Budapest. After he had settled in America he went on doing research in this field for a while, but the fundamental observations had been made in Szeged, and I think I am right in saying that these latter results by Szent-Györgyi's outdo in importance his previous investigations. Had he been luckier, he might have been awarded a second Nobel Prize. Switching over to the study of muscle movements had firm roots in the past: thanks to his activity, the mainstreams of the study of energy production had already been formed and it was time for the details to be described.

Furthermore, it became evident that a unique phosphate organic compound, the "big source of energy", i.e. adenosine triphosphate (ATP) is an outcome of

energy production. It was in these years that the Soviet scientists Engelhardt and Lyubimova discovered that ATP and myosin, the fibrous protein of muscle fibre interact: while ATP hydrolases, myosin threads become deformed. According to Szent-Györgyi's ingenious insight, we have now arrived at an appropriate model for the study of the energy source synthesized in energy production as it is in its biological function, i.e. motion. It took only a couple of years of intensive research to identify the biochemical mechanism underlying the physiology of motion. It appeared that this necessitates the presence of two proteins, myosin and actin (both were isolated in a pure form during these investigatios), which interact with each other in the presence of ions that can be found in muscles cells. The rate of consumed energy of ATP during motion is proportionate to the extent of motion. Since research continued in a country which was separated from the outer world during the war scientific community learned the sensational results only after the liberation of Hungary in 1944. It would be no exaggeration to state that the many volumes summarizing the achievements of Szent-Györgyi and his colleagues, caused a world-wide sensation among biologists. These volumes are a treasure in every self-respecting biochemist's library. Following the investigations started in Szeged, there are a number of countries where high-level biological experiments are at present being carried out that relate to the study of the physiology of motion at the molecular level. Along the path made by Szent-Györgyi it is now evident that any cell motility, any change in cell shape, and even a major part of matter transportation (e.g. in the nerve cells) takes place according to the principle formulated in Szeged thus providing a subtle proof for Szent-Györgyi's idea: "nature is economical, it will not invent a new mechanism for the solution of the same problem". I think we should pay attention also to the fact that the cognitive process initiated by Szent-Györgyi almost 50 years ago, which linked a relatively complex physiological phenomenon to molecular and submolecular interactions, opened a new way towards the interpretation of mechanisms of biological control. The first results of these studies now appear to be bearing fruit.

In the sixties Szent-Györgyi's attention gradually turned towards the malignant transformation of cells, which was preceded by the recognition of the fact that in the case of the living state the fundamental laws should be detected on the submolecular and, indeed, on the subatomic level. He thought that some special kinds of substance, tree radicals which are difficult to analyse, can play a role in cell transformation and, consequently, in the formation of malignant tumours. He had an ever-growing confidence in the idea that malignant transformations can be explained only after an understanding of normal changes in the cell. In America, in the maritime biological laboratory of Woods Hole he and some of his colleagues started wearisome research into the biochemical processes of tumoruos tissues. He dealt with the metabolism and effects of compounds similar in properties to ascorbic acid which he had isolated and studied at the beginning of his scientific career.

Although his contribution to a better understanding of cancer has not as yet developed into significant results, he did, on the one hand, call attention to such unique states of substantial systems which seem to open new paths in field of physics and biophysics, and, on the other hand, he created a special form of scientific collaboration named "the Laboratory without walls", which is sponsored by voluntary contributions and involves many scientists all over the world collaborating not only in interdisciplinary fields but also in intercontinental dimensions.

The above glimpse of Szent-Györgyi as a scientist reflects his admirable individuality. The formation of his personality is, according to him, connected with his education and the atmosphere of his parents' home, particularly his mother, Josephine Lenhossék, who showed him the best of humanitarian values. Apart from his genius, it was the education at home that played a decisive role in his scientific attitude:

— he saw everything others saw, but he thought about it as no one else did,

— he was extremely accurate, precautious and disciplined during experimentation (just remember, among other facts, the isolation of ascorbic acid in crystalline form, the isolation of myosin, actin and ATP),

— he never chose the easy way, but achieved his results and discoveries through failures,

— thus, everything concerned himself with opened new pathways and far-reaching horizons for research.

He arrived at his universally significant results while working within a community.

An efficient collaboration cannot be maintained without extraordinary personality. Those working with Szent-Györgyi could not withdraw themselves from his influence. This influence was especially manifest in the community in Szeged, where Szent-Györgyi's most significant discoveries were made. The colleagues he had chosen to work with admired and followed his train of thoughts and carried out hard and accurate work. This is how the "Szeged School of Biochemistry" emerged providing for successful team work along with a healthy spirit of emulation.

We can pay due respect to his genius and preserve a faithful memory of him by acting in accordance with the path he showed.

4.

EDE KAPUY

Albert Szent-Györgyi and the electronic structure of matter

Honoured Guests!

There have been few active workers in the natural sciences in this century able to exert a long-lasting influence on branches of science outside their own narrow specialities. Albert Szent-Györgyi was one of those few.

He was already an internationally known and recognized biochemist when, for years after receiving the Nobel Prize, he said in his famous Korányi lecture entitled "The Study of Energy Levels in Biochemistry":

> "Biochemistry is, at present, in a peculiar state. By means of our active substances we can produce the most astounding biological reactions, but we fail wherever a real explanation of molecular mechanisms is wanted. It looks as if some basic fact about life are still missing, without which any real understanding is impossible. It may be that the knowledge of common energy-levels will start a new period in biochemistry, taking science into the realm of quantum mechanics."

The essence of the lecture appeared in Nature in 1941 and owing to the high prestige and authority of that journal it attracted much attention.

At that time many experimental results requiring explanation became known. For instance, photosynthesis showed that several thousand chlorophyll molecules react as a single functional unit and collect four light quanta absorbed at different points for the reduction of one CO_2 molecule. From this it was concluded that the activated electrons move freely within the structure consisting of chlorophyll molecules. A similar conclusion was reached in connection with muscle contraction. At the splitting of ATP, energy is released at a single point, but along the muscle fibre it is transferred to a number of myosin molecules.

Szent-Györgyi supposed that the structures consisting of protein molecules behave as if they contained common, delocalized electronic orbitals in which the electrons can move easily, carrying electricity, that is energy. In other words, the proteins are, like some crystalline solid bodies, semiconductors. In the explanation of life phenomena we cannot stop at the molecular level, but have to go down to the submolecular level, where the laws of quantum mechanics apply.

The hypothesis concerning the electronic properties was a bold challenge to physicists. In spite of the war, it attracted great attention, and investigation was begun to prove the hypothesis experimentally and theoritically. Although Szent-Györgyi always stressed that he was not a physicist, that is he did not possess the technical knowledge what is indispensable for the cultivation of theoretical and experimental physics, he set forth his views so convincingly that he succeeded in drawing the attention of physicists to this problem.

The electrical resistance of the proteins was first measured by Baxter and Eley. The results seemed to prove Szent-Györgyi's hypothesis that they are semiconductors. The first theoretical studies were made by Evans and Gergely, who came to the same conclusion. Theoretical verification was difficult because there were no electronic computers at the time, and exact quantitative data, which are necessary for verification, can in this case be obtained only by a tremendous amount of calculation.

From the second half of the fifties, more and more workers began to deal with similar problems. This was largely attributable to Szent-Györgyi, who called attention again to the biological aspects of the electronic properties of the proteins in his monographs "Bioenergetics" (1957) and "Introduction to Submolecular Biology" (1960) published by the Academic Press.

The volume entitled "Horizons in Biochemistry", published also by the Academic Press in 1962, was already dedicated to him. The volume contained the papers of 28 illustrious authors reporting on the most recent results in this field.

By the beginning of the sixties, a new field of research had developed, the workers of which studied biochemistry like Szent-Györgyi, from the point of view of electronic structure. The main representatives of this trend besides Szent-Györgyi were Frenchmen (Daudel, Pullman), Englishmen (Coulson), Swedes (Löwdin), and Americans (Pauling, Kasha). At the end of the fifties, Ladik and coworkers started theoretical studies in our country along the lines of Szent-Györgyi's conception. Fortunately the saying that no one is a prophet in his own country did not prove true.

The workers in this field of research, who first called themselves quantum biochemists, then quantum biologists, have since 1968 been organizing annually the since then famous international symposia on quantum biology and quantum pharmacology at Sanibel Island, Florida. Szent-Györgyi regularly attended them until almost his death and gave several lectures on these occasions. The symposium of 1975 was dedicated to him, when 100 outstanding researchers from 20 countries celebrated him.

Rapid developments in the technique of measuring and of electronic computers has made it possible to examine his concept more closely. It has been found that electrical conduction in proteins and other organic substances is not necessarily based on the energy band mechanism, but occasionally other mechanisms, such as activated tuneling, the transport of protons and ions, solitons, charge density waves, etc. may also be responsible. Pure crystalline proteins are usually not semiconductors, but insulators, that is, their electronic energy levels are completely filled with electrons which can be put into empty free orbitals only by great energy expenditure. However, if they come into interaction with so-called electron acceptors, which extract electrons from the filled electronic energy levels, they become semiconductors. This conclusion has been proved by many experimental and theoretical studies. Szent-Györgyi took this fact as the basis of several hypotheses. A characteristic of the living state is regular cell division. According to Szent-Györgyi, the fact that the molecules become conductors due to the interaction with acceptors plays an essential role in regulation. If the interaction with the electron acceptors stops for some reason, the molecules become insulators and irregular cell proliferation occurs, which is the main feature of cancer. This is the electron theory of cancer. Although this hypothesis has been somewhat neglected since the discovery of oncogenes, nobody disputes its right of existence.

Szent-Györgyi upheld his basic idea to the end, declaring at the symposium on quantum biology and quantum pharmacology in Florida in 1977:

"I am deeply convinced that these macromolecules are not really the actors in the drama of life. They are rather the stage in which this drama is enacted while the real actors are mobile electrons.

It will be your job to bring biology and quantum mechanics closer together."

In terms of physics this means that the behaviour of the molecules is determined by the electronic structure. The development has accelerated in the last decade. Fifth generation computers make more precise calculation of the constants of larger molecules possible, while after the appearance of computer graphic methods experimentation with molecules on the TV screen started.

The theoretical methods have a double advantage:

1. they help us to understand the phenomena;
2. they make it possible for us to calculate properties, which are very difficult to explore by measuring.

The research inspired by Szent-Györgyi by now has gone beyond biology. In the middle of the seventies it was found that there exist organic molecules which are not semiconductors, but as good conductors as metals. The perspectives are fantastic. It is thought probable that miniaturization of electronic devices leads to the molecular level, where the unit is a single organic molecule. These molecules can perhaps be put together to form a computer just as amino acids combine in the course of peptide synthesis. The "computer" thus formed has a much smaller capacity than the brain, but it calculates much more quickly. The aim has been set to develop a computer that can be connected "on line" with living organs.

The lesson that Hungarian researchers can learn from Szent-Györgyi's life work is that important results can be achieved only through intensive international interdisciplinary cooperation; thus biology, chemistry, physics, and computer technique must be coordinated or combined for the purposes of successful research. All the possibilities in our country should be used to this end. There should be cooperation between universities and academic institutes as well as between university departments. Another important lesson is that the "capital" gained by the results must be used to start new research, and we should not stop on reaching the first result. The third lesson to be taken seriously is that publication in an international journal of high circulation is essential to ensuring international recognition of important results.

5.

DÁNIEL BAGDY

Fellows' reminiscences

Honoured Guests!

Those who we honour and love do not abandon us when they die. The oeuvre of outstanding scholars, particularly of those awarded the Nobel Prize survives in the international world of science, the importance they achieved at a given time becomes a significant component in the history of science. Their radiant intellect does not come to an end with their death but survives through their students. Their spiritual heritage is not confined by national borders. Thus those who were the fellows of Szent-Györgyi's Institute of Medical Chemistry in Szeged, and later in Budapest, recall to mind both here in Hungary and far from their home country the time they chanced to spend with him striving on the path towards scientific truth carrying out research in his laboratory. The grief over his death thus becomes a moment of gratitude and enthusiasm. It is indeed a great feeling to realize that we were privileged to collaborate with him, and that the richness of his personality radiated and still radiates to us now when he is no longer among us.

We have rather a vague understanding of the biochemical basis of the memory. What we already do know is that the principle of selection manifests itself both in the process of memory fixation and storage and in the recalling of a memory. The human brain — unlike mechanical data storage devices — does not fix all events with equal emphasis in the memory. It distinguishes between important and unimportant ones. The memories I am now recalling to mind after some decades are the personal experiences of fellows which have proved decisive throughout their lives and which, at the same time, throw light upon some characteristic features of Szent-Györgyi's individuality.

Ilona Banga, Szent-Györgyi's first student in Szeged, claims that 50 years ago research into biological oxidation did not mean for Szent-Györgyi merely a field of interest. We had also to face the task of setting up with the help of his personal charm a research team of colleagues with whom he would then be able collaborate in finding proofs for his ever newer and ever-developing theories. In accordance with Szent-Györgyi's method we had to perform some series of experiments over and over again and observe the tiniest details affecting the difference in results obtained from similar experiments. I think it is necessary to emphasize the maximal reproducibility of the experiments to be carried out because a number of insights which the scientist takes for a discovery do not become a scientifically sound and progressive hypothesis because they lack the details revealing the prevailing relationships and a repeated justification of the results. This is why the years spent in Szeged have become for all his fellows the symbol of research at the highest level.

Kálmán Laki: As a medical student, I met Szent-Györgyi in 1931. He gave lectures on biochemistry at the Medical Faculty in Szeged. His presentation was admirable. He revealed to us secrets of physiological processes we had never heard of before. Although I was not obliged to, I sat for the exam in biochemistry. He was satisfied with my exam and suggested that I join his institute. I could not have received a reward greater than that. This was the beginning of my collaboration with Albert Szent-Györgyi at the Szeged Institute of Medical Chemistry. All of us working there had the feeling that we were participating in exciting and fundamental physiological experimentation. Fifty years later, when I was in hospital in Woods Hole, he and his wife used to visit me and talk to me there day after day.

F. Brunó Straub: I am grateful to him for directing me to a field in which I have worked with so much happiness. Had it not been for him, it would never have occured to me that I could deal with biochemistry, without him I would never have learnt what scientific research meant. He could make us feel that we are in need of understanding and a change not only in our research into biochemistry but also in the world around us. He strived for an understanding of the living state not on the basis of the hypotheses of others but rather relying on his own observations. To young scientists I would recommend Szent-Györgyi's method: a man must live to observe reality leaving current theories aside. No one should think that Albert Szent-Györgyi's life was an easy way to triumph. We had to face obstacles before his activities in Szeged, while in Szeged, as well as later, but his great will-power helped him generally to find the right route which was often not the easier way.

Ferenc Guba: One of Szent-Györgyi's virtues as a leader was that he glowed with an affection and enthusiasm towards science providing an atmosphere indispensable for creative work at any place of work. For several months I had the task of studying the behaviour of proteins extracted from mucle from the point of view of viscosimetry. Taking such measurements are not the most diverting of human activities. Still I fanatically carried on my measurements because I was convinced — convinced by Szent-Györgyi — That the revelation of muscle movements assuredly depended on my measurements.

Tamás Erdős (Laboratoire d'Enzymologie, Gif-Sur-Yvette): At that time we worked very hard and we had a wonderful time. I thought I was Fortune's darling: I participated in or witnessed exciting experiments and the "Prof" inserted every little detail into the whole with admirable simplicity. All Szeged was envious of our legendary 5 o'clock tea parties, then the river Tisza was close by and the Prof was glad to lend us his canoe ... after lunch we played volleyball .... And then came the war and everything ceased .... .

Among the inspired colleagues of Szent-Györgyi's in the thirties who attained international renown were Ernő Annau, Béla Gözsi, Mihály Gerendás, László Vargha and István Huszák, who worked enthusiastically with Szent-Györgyi.

László Loránd (Northwestern University, Evanston, Illinois): I entered Szent-Györgyi's institute as a medical student in 1946 with a recommendation from Kálmán Laki. Before the "Prof" gave his positive answer I had had to prove that I could play volleyball. Szent-Györgyi placed natural confidence in all his colleagues because he thought that science is a universal church into which only talented and honest people can enter. When he came over to our lab he would always take care not to disturb us. He would always wait until we finished our experiment. From the start Szent-Györgyi has been a pattern in the practice of science.

Ábel Lajtha (Rockland Research Institute, Center for Neurochemistry, Wards Island, New York): we profited from lunches at the institute not only because they

were a time when we met one another but also because they presented us with the opportunity to exchange our points of view. We would regularly discuss — and mostly it was the "Prof" who started the discussion — topical problems pertaining to scientific, cultural, and political life. After a lunch we would play volleyball in the Trefort Garden. Nowadays it comes as natural but at that time the majority of professors were obsessed with their reputation and accordingly, their behaviour, so that our games appeared almost like some revolutionary ignoring of tradition. With him as the initiator and active participant of every game we could not only forget about the hard times were living in but he could also create a friendly atmosphere for cooperation. He was aware of our weaknesses but he was always ready for a chat. He had the courage to stand by his principles whether they were well-received or not, and he also had the courage to admit his failure. He had the strength to remain faithful to himself and not to strive for high official rank or a place in the organizations of power, but to live happily and devote his life to mankind.

János Gergely (Boston Biomedical Research Institute): It is his enthusiasm, his affection for science and his devotion to scientific research of which most of us can give only a pale reflection, that I recall in the first place. And I shall always remember his sparkling thoughts, his accurate observations, his fervour for palpable facts which is often lost in the present world of well-equipped laboratories. One of his marked personal features was his love that shone for everybody who chanced to know him. His close collaborators still feel this love and it means much to them after so many years.

Endre Bíró (Institute for Biochemistry, Eötvös Loránd University, Budapest): Everybody who worked with him, even the freshmen, were convinced that what we are dealing with is the most important thing in the world. How did he manage to make us feel like that? What was the secret of his personal charm? He never ever delivered a speech on the importance of the scientific problems we were tackling, nor did he organize meetings on the international state-of-the-art concerning our field of research. We were young and he was the Nobel Prize winner, the major specialist. Is that an explanation? Certainly not. How did he, then, make us realize the importance of what we were working on? He made us realize it because he believed deeply in his work. As naturally as people breathe in air, he believed in the order of importance of facts. How did he rule his Institute? I might say: nohow. He did not need to: we all followed him in our own way as much as we could. Those unaffected by his magic were dismissed. Without any anger, but irrevocably. Like a conductor who realizes that someone in his orchestra lacks a sense of rhythm.

And in the end, let me tell you some of my personal experiences as a fellow who joined his Institute rather lately. — Debrecen, November 1937. An unusual lesson of chemistry at the Fazekas Mihály High School of Sciences. There are no questions that day because our teacher of chemistry devotes the whole lesson to a professor in Szeged who has been awarded the Nobel Prize. Who has acquired fame not only for the city of Szeged and Hungary. As sixteen-year-old pupils and with a scanty knowledge of organic chemistry we may not have understood everything about Szent-Györgyi's discoveries. But Mr. Nádasdi the teacher's enthusiasm affected even those pupils who disliked chemistry. I have to this day preserved the enthusiasm towards science that I came to feel in connection with the news about Szent-Györgyi's Nobel prize. — Kolozsvár, Summer of 1942. From morning to evening I sit in the auditorium at the Congress of the Society of Hungarian Physiology. I am fully caught up with the air of scientific debates and my first encounter with the duel of arguments and contrarguments. I am enthusiastic over

the combat between doubt and certainly of finding scientific truth. I am thrilled by the fact that here it is not dignity or official rank that appears as the decisive factor. Szent-Györgyi is the greatest polemist and I listen to him with a passionate heart and mind. Because he is not elevated and does not strike attitudes, he does not argue with the weight of his Nobel Prize, but does so with clearcut argumentation based on exceptionally precise observations. With the simplicity of a scientist who is capable of seeing the connection between the details and the whole. With witty remarks pertaining to essential questions. With virtues I have since then realized to be inseparable from scientific progress. — Debrecen, February 1945. We began our second semester lectures in the Institute for Physiology in the absence of our professor and Head of Department. Suddenly Szent-Györgyi arrived one day. He was to stay only for a couple of days because, he told us, he would meet somebody here. He moved into the professor's room on the second floor. We were, of course, eager to help him, but he would light the fire in the stove himself. My mother fed him. He praised one of her dishes very much. My mother was very proud of this all her life. The guest he had been expecting arrived on the third day. I was close to the door and I opened it since I was the accredited head of department. Upon seeing my white gown, the man in a black coat with a fur collar put out his hand, saying: "I am Mátyás Rákosi". Szent-Györgyi came running from his room at the end of the corridor and took his guest by the arm and led him away for the meeting. About one-and-a-half hours later they were just passing the door of my office when I stepped out and saw that they were no longer holding each other by the arm. I did not think then that it could be a sign of friendship or a sign of lack of friendship. But we were soon to learn from the daily press that in the West Szent-Györgyi was considered a friend of the communists, while here, at home there were many who thought he was a friend of the Western world. — Budapest, autumn of 1946. At this time I was already working with Kálmán Laki at the Szent-Györgyi Institute. Among us there were people with different diplomas as chemical engineers, chemists and physicians, but it was apparent from Szent-Györgyi's example that a good biochemist should have a sound background both in biology and in chemistry. And indispensable to both is a good knowledge of mathematics. Szent-Györgyi asked professor Pál Gombás and his colleagues to help us in refreshing our mathematical knowledge with a view to developments in quantum chemistry. One afternoon a week we spent with him in the library of the Institute listening to these lectures. At first we did not have many difficulties in understanding the subject matter. But soon we came to a point where even the most experienced chemical engineers showed ultimate signs of miscomprehension (the chemists and physicians had already given up). The two small blackboards that could be changed by pulling down and pushing up would be rapidly filled with differential and integral equations. In the meantime we would have our usual tea and biscuits. And then the lecture was over. Szent-Györgyi stood up and broke the silence thanking the lecturer in the following way: "Thank you very much for this interesting and exhausting lecture. To tell the truth, the only thing I could understand were the three biscuits I ate in the meantime". The tension of our ignorance dissolved in a burst of laughter, which included the lecturer as well so that he could not have been offended. At this time I realized that Szent-Györgyi was a scientist who not only recognized the boundaries of his knowledge but did not conceal them from his colleagues and others. And it concerned topics other than abstract mathematics. When people interested in the research at his Institute asked him a question about blood coagulation, he would answer briefly: "Ask Kálmán Laki".

Honoured Guests!

A mosaic is a picture put together from tiny coloured pebbles or pieces of glass. The colourful pictures in our memory, the fragments of ever-lasting experience recalled by his fellows make up a very rich and unique mosaic: the spiritual portrait of the ideal scientist. The portrait of a true humanist and a scientist who strived with all his might for scientific cognition. In this portrait we can see — to use Attila József's words — "a European amongst the white men" who could remain European among the American whites. The actual message of Szent-Györgyi's rich intellectual heritage for researchers in biochemistry in this country is that one can break through to the international forefront of science and maintain this position. But Szent-Györgyi has a message not only for biochemists. He has something to say to the whole of mankind: "A world transformed by science can be run only by the spirit, which created science: the search for truth and putting two and two together with a cool head, without fear, greed and lust for domination." (A little catechism — Albert Szent-Györgyi Bulletin of the Atomic Scientists, April, 1975).

The history of mankind may bring further stormy winds in the future that will disturb the activity of scientific workers. But if we set out for work in the mornings in the same way as Szent-Györgyi left for his laboratory even at the age of eighty, then we will know that it is the creation of some new knowledge, some new beauty, that is worth living for. We have understood and accepted his spiritual heritage.

6.

BÉLA CSÁKÁNY

The character of Albert Szent-Györgyi

Honoured Audience!

Having been given the privilege of delivering the closing speech of this session, I find it hard to add anything to all the merits that have been mentioned by the various speakers about Albert Szent-Györgyi's career, scientific results and his long and deep friendship with our town. Still, we may gain a more complete portrait of the man himself if I conclude with an attempt to show something of the character that belongs not so much to a world-famous scientist as to an extraordinary man.

Today we have heard of Albert Szent-Györgyi that his view of life was close to the humanism of enlightenment. He would, however, not only wisely observe the ferment of life around him but he always strived to change it. He wanted to live a complete life, bravely risking, when necessary, his convenience and security. In this sense, he can be viewed as a renaissance-type individual with the touch of a polyhistor: he was not only a scientist with a range of knowledge covering anatomy to theoretical physics but also a scholar of the humanities ranging from poetry to practical politics.

We have heard that he was an optimist. Let me add a little colour to this undoubtedly true statement. It is also true in the sense that he always radiated optimism around him. But he did have some moments in his life when he was left alone with science and the responsibility for his country. He was aware of what the great Italian philosopher, Gramsci, had formulated in the following way: "In certain situations optimism is the utmost cowardice." Everyday optimism would have urged him to strive for survival for during both the first and the second world wars. But he did not do that. He tore himself free of the catastrophe of the war risking both his life and honesty. And a quarter of a century later he was the first scientist in the country who bore the risk of mortal danger in order to try and help his home country. His epic adventure reminds us of Attila József's lines: "I set off against gods — with no trembling heart — in a slight white garment". Albert Szent-Györgyi's bravery — nomen est omen — was that of the dragon-killing knight who knew he might lose the battle but still attacked the dragons: the Nazi Empire, and years later, the monster of cancer.

We have heard here about Szent-Györgyi as a patriot, about his relationships with his home country, that of a stone cast upwards. He spent half of his life far away, still there are few Hungarians who can have done more for the fame of their country than Albert Szent-Györgyi. Nowadays it sounds anachronistic to talk about the Hungarian Genius, since earlier this notion was linked with retrograde and harmful national self-importance and pride. Still, we can scarcely doubt that the best spirits which every nation produces are firmly rooted in her material presence

and historical past. In this sence Szent-Györgyi has embodied the Hungarian Genius; and this does not conflict with what he writes in his reminiscences: "I have betrayed feudal Hungary", nor does it conflict with the fact that he spent more than four decades abroad. The reflection of his true feelings towards his country is expressed in his face beaming with happiness in the photos taken in the seventies on the two occasions when he visited Hungary, which are exhibited in the Assembly Hall of the university. We shall preserve in our memory as a symbolic fact his last homecoming when the crown of our King Stephen was returned.

And he was a citizen of the Globe not only during the fifteen years he spent in Szeged as a beloved townsman among the inhabitants of our town but also in the years abroad. In the intervals between his journeys he would, besides the exact sciences, amuse himself with culture and sport — the other two great gifts of antiquity. His love for mankind mingled with anger, much in the same way as Biblical prophets and great Hungarian poets loved their nation. At the age of 77 during the war in Vietman he wrote his famous book for the young entitled "The Crazy Ape" in which he confronts pure ideas with the madness of militarization. In this book he writes: "Mankind has reached a crossroads, and is confronted by two road signs pointing in opposite directions. One of these is symbolized by the happenings at My Lai. It points towards a dark world, dominated by military-industrial complexes and conducted by fear, hatred and distrust. ... The other road sign points in the opposite direction. It would lean man to a sunlit, peaceful and clean world, marked by good will, human solidarity, decency and equity, and free of hunger and disease, with a place for everyone."

Szent-Györgyi did not spare himself anf fortune rewarded him with a long life full of results. Let me bid farewell to him with some words from Tennyson's Ulysses which he could have chosen as an ars poetica for his career:

"... all time I have enjoy'd
Greatly, have suffer'd greatly, both with those
That loved me, and alone; ...
... I am become a name:
For always roaming with a hungry heart
Much have I seen and known; cities of men
And manners, climates, councils, governments,
Myself not least, but honour'd of them all;
...
I am a part of all that I have met;
Yet all experience is an arch wherethro'
Gleams that untravell'd world, whose margin fades
For ever and for ever when I move.
...
... every our is saved
From that eternal silence, something more,
A bringer of new things; and wile it were
For some three suns to store and hoard myself,
And this grey spirit yearning in desire
To follow knowledge, like a sinking star,
Beyond the utmost bound of human thought."

Hereby the Memorial Session for Albert Szent-Györgyi, the Hungarian Nobel Prize winning scientist, the outstanding citizen of Szeged, the great professor of the Szeged University is adjourned.

7.

ALBERT SZENT-GYÖRGYI
IN SZEGED
(Permanent exhibition)

Arranged by:

DR. TIBOR SZABÓ
research fellow

and

DR. ANDOR ZALLÁR
Head of the Central Library of
Szeged University of Medical Sciences

Designed by:

JÁNOS SINKÓ
artist and lecturer at the
Teachers' Training College in Szeged

"... With deep and silent emotion I receive this document by which the affection and generosity of the city have elevated me to the highest position a city can ever elevate one of its citizens. The title of Honorary Freeman is but a superficial sign of my having attained the highest honour a man can attain: the affection of my fellow-citizens. I have always believed that the most one can attain is a grave-plot. But fortune has given me much more than that: I am enthroned in the heart of my fellow-citizens just as I long ago too this city to my bosom..."

(Excerpt from his speech delivered at the City ceremony when he became Honorary Freeman of Szeged, 1st December, 1937)

"... Now I have no house by the bank of Tisza. My house stands by another stretch of water, today I work in another country. My endeavours are for the whole mankind but I take this opportunity to declare that I am Hungarian and I am attached to this fatherland. ... I wish to fortify the ties which bind me to Hungary and the University of Szeged. I see that in this little country the respect and affection for science is so great, the appreciation of general human values is so high that, for this reason, I can rightly expect Hungarian science to grow enormous..."

(From his speech delivered when the degree of Honorary Doctor of the Szeged University of Medical Sciences was conferred on him in Szeged)

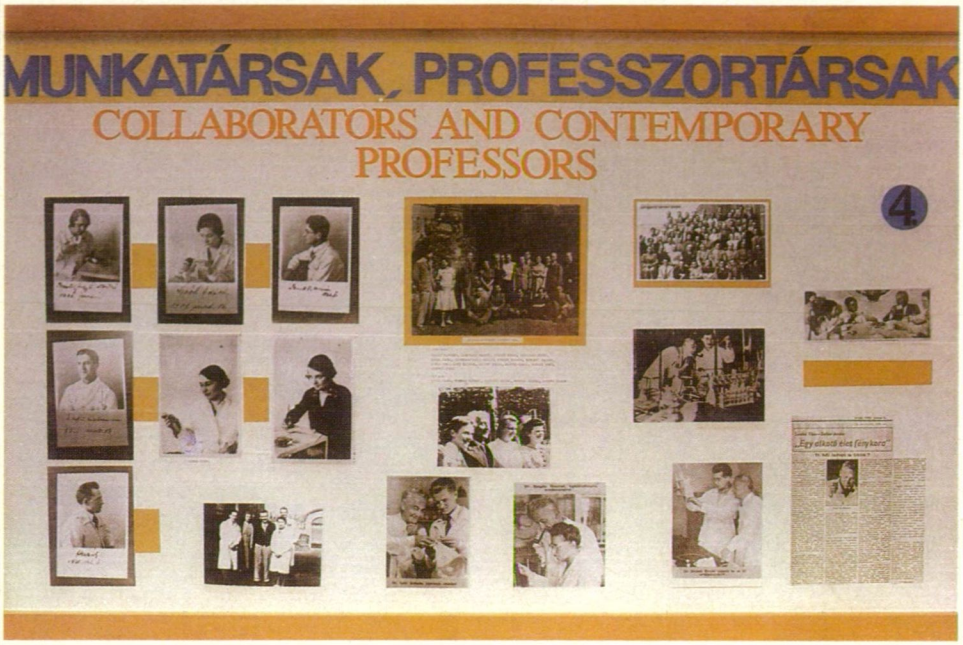
"What brightened this ceremony was not its glamour and splendour but warm affection, the greatest of human values. The conferring of the degree of Honorary Doctor is one of the most remarkable events in my adventureous life because I have never before enjoyed so much affection, respect and fervour."

(His note in the album of the University)

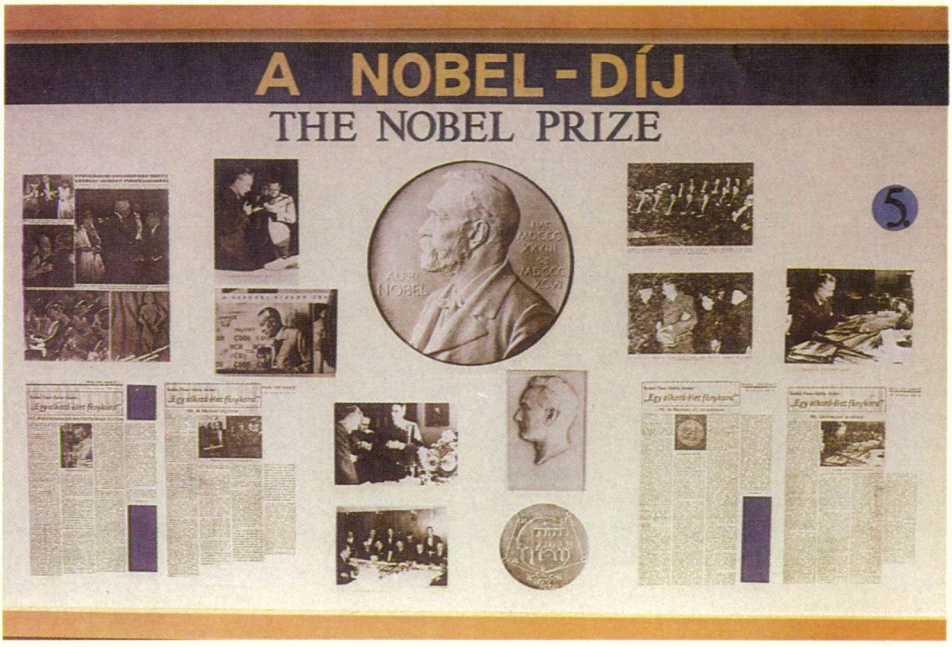
He was born in Budapest on 16th September, 1893. His father, Miklós Szent-Györgyi, was a clerk who later inherited land in Kis-Kér. His mother was the daughter of József Lenhossék, professor of the University in Budapest. He spent his childhood in Kis-Kér, then in Budapest. Together with his brother he attended the grammar school in Lónyay Street. He joined the army as a medical student in 1915. In 1917 he married Kornélia Demény. In 1918 he became assistant at the University of Pozsony. In 1919, he published an article in "Esztergomi Népszava". From 1919 till 1926 came the years of wanderings: Prague, Berlin, Hamburg, Leyden, Groningen, Rochester.
1926—1930: Cambridge. There he made his discovery of hexuronic acid. On 29th September 1928 he was appointed professor at the University of Szeged; he was given a two-year leave of absence to complete his research in Cambridge.

He takes up his university post on 26th September 1930 and with his family (his mother, wife, and daughter Nelly) he moves to Szeged. Until 1935 his institute and home are in the building of the former metallurgy school that had been handed over to the university. From 1935 to 1940: He resides at Rudolph Square, then in a villa in New Szeged at 20 Bethlen Street. In 1931 he discovers vitamin C, and in 1934, together with István Rusznyák and others, vitamin P. In the school year 1934/35 he is Dean of the Faculty of Medicine, then later Deputy Dean. His research is supported by the Rockefeller Foundation. For his scientific achievements he receives many acknowledgements at home and abroad, reads a number of lectures abroad. He is one of the founders and the secretary of the Hungarian Society of Physiology.

His personality differs from the customary image of a scientist in many respects. His inclination towards the fine arts had already developed in his childhood, he was instructed in piano-playing, and his brother became a violinist. When the time of five o'clock tea parties at his intitute arrived they also discussed questions of arts and literature. We also find him among the spectators at the ceremony celebrating the reconstruction of the National Theatre. In his opinion science is also an art. He went in for different sports. He became junior champion in speed skating, his best loved sports were tennis and volley-ball, on his motorbike he made a trip around Europe. The citizens of Szeged scarcely ever saw him without his little Buick. He could not only ride a horse but he became a licensed glider and aeroplane pilot.



Together with his young colleagues he fonded a school at his institute in Kálvária Square which moved to Dóm Square in 1935; most of his colleagues have become university professors or directors at some scientific institution. The photos of his colleagues covered the walls of his office. Of those in the tableau we select just three: his wife, who was also one of his co-workers, his secretary, Margit Zétényi, and F. Brunó Straub...



He won the Nobel Prize on 28th October 1937 as the first and only scientist in the country to win the highest scientific distinction for his activity in his fatherland. The attention of the world turned to Szeged and its University, greeting letters and telegrams poured in, reporters bombarded the world-famous scientist. The university had a commemorative plaquette made. The prize-giving ceremony took place on 10th December in Stockholm where his wife and daughter were also present. Former pupils of the grammar school in Lónyay Street celebrated their school-fellow and class-mate's success.

The Nobel Prize acquired glory for Szeged and its university. On 1st December 1937 Albert Szent-Györgyi was elected Honorary Freeman of the city of Szeged: on 7th April he became Honorary Doctor of the University of Szeged. The brightness of the ceremony merged with a feeling of unity between the city and the university. In addition to the honorary title the city decided to erect a statue of him and to change the name of Rudolph Square to Albert Szent-Györgyi Square (he lived there at the time of winning the Nobel Prize) and to build a "Szent-Györgyi" villa in New Szeged.

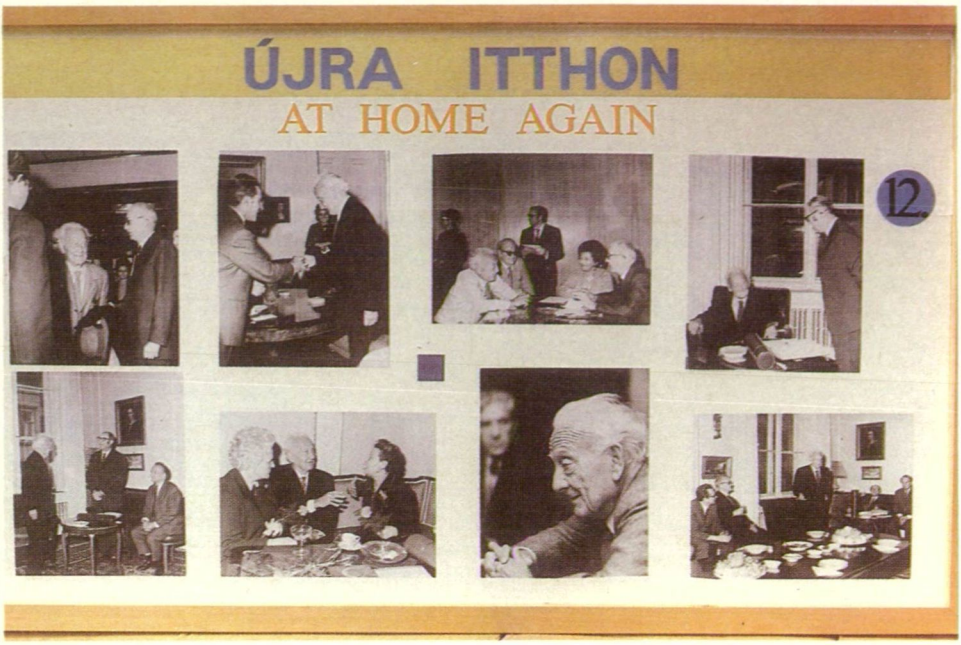
In 1940 Albert Szent-Györgyi became Rector of the newly-founded University of Szeged. He was not just an administrative leader of the university but he also strived towards a new, democratic university in a country shadowed by approaching fascism. He brought into existence a progressive youth organization named the University Youth of Szeged. He wanted his students to feel at home at the university, he set up a students' club in consideration of thier demand for entertainment, he also organized a theatre company that preformed Hamlet. On his fiftieth birthday he received a cordial commemoration from his students. He married for the second time on 18th October 1941. His bride was Márta Borbíró.

In 1939 he turned to the field of the biochemistry of muscle movements. After 1945 he carried on this research in Budapest, and then, until 1964, in his research institute in Woods Hole near Boston. The most outstanding results had already been born in Szeged but the war isolated the country from the scientific world abroad, so the true importance of his research could be recognised only in the seventies. He declared the first results of his research on muscle tissue in Szeged to be the greatest experience in his life.

The professor who took an active part in the antifascist movement was put under police supervision; later he had to hide from harassment by the Gestapo in Subotica and in Budapest. He was set free by the Soviet troops on 10th January 1945. Already as professor of the university in Budapest he displayed remarkable political and scientific-political activity as, e.g. honorary president of the Hungarian-Soviet Cultural Society; his photo can be found on the front page of the journal of the society. After emigrating to America he did not show up for a long time; from the sixties he published more and more papers, and radio programmes and reports began to appear about his life and work.

In his letters he expresses more and more often that he wants to visit his fatherland. His wish came true on 7th October 1973. He arrived home after 26 years of absence. His colleagues and pupils awaited and greeted him at the airport. He read a lecture at the Loránd Eötvös University, radio and television broadcasts commemorated his activity in Szeged and in America.

He arrived home on 11th October 1973 and participated at the inauguration of the Biological Research Centre of the Academy of Sciences in Szeged. He felt at home on the following day as well, when, on 12th October, he became Honorary Doctor of the Szeged University of Medical Sciences. More intimate than the enthusiastic welcome by university students and professors were the celebration proceedings when the 80-year-old scientist heartily thanked the city and the university for their warm reception.



The ceremonious occasion was followed by friendly meetings. In the photos reminiscences of the past are called to mind by his former colleagues.

(Five years later, on 7th January 1978, he visited Hungary again, but only for two days as a member of the delegation returning King Stephen's crown and the coronation regalia to Hungary. He met some of his friends and reporters but the following day he flew back to the United States.)